



United States Department  
of Agriculture

# Arikaree Watershed



Hydrologic Unit Code 102500001

Natural Resources  
Conservation Service

## Rapid Assessment

Lakewood, Colorado

RWA 10250001

September 2008





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## **Introduction**

### **Background Information**

The Natural Resources Conservation Service (NRCS) is encouraging the development of rapid watershed assessments in order to increase the speed and efficiency generating information to guide conservation implementation, as well as the speed and efficiency of putting it into the hands of local decision makers.

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals.

### **Benefits of these Activities**

While rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide the benefits of NRCS locally-led planning in less time and at a reduced cost. The benefits include:

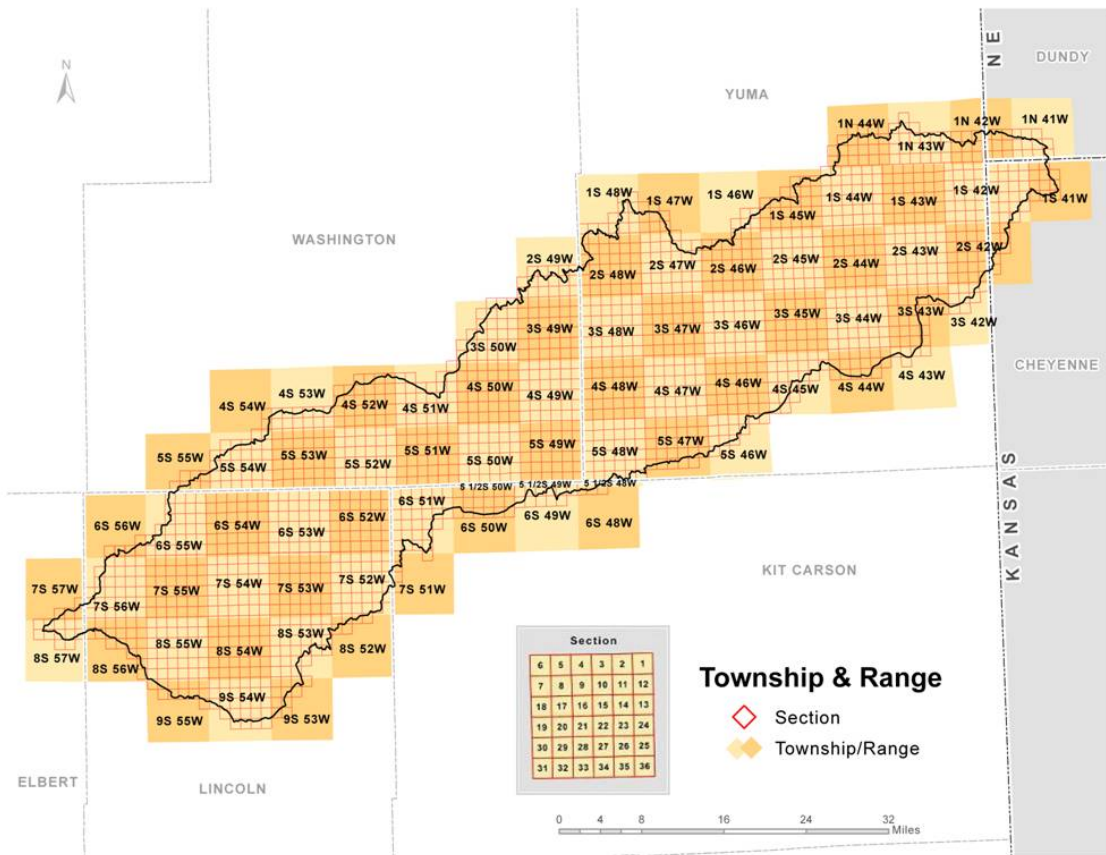
- Quick and inexpensive tools for setting priorities and taking action
- Providing a level of detail that is sufficient for identifying actions that can be taken with no further watershed-level studies or analyses
- Actions to be taken may require further Federal or State permits or ESA or NEPA analysis but these activities are part of standard requirements for use of best management practices (BMPs) and conservation systems
- Identifying where further detailed analyses or watershed studies are needed
- Plans address multiple objectives and concerns of landowners and communities
- Plans are based on established partnerships at the local and state levels
- Plans enable landowners and communities to decide on the best mix of NRCS programs that will meet their goals
- Plans include the full array of conservation program tools (i.e. cost-share practices, easements, technical assistance)

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**Rapid Watershed Assessments provide information that helps land-owners and local leaders set conservation priorities.**

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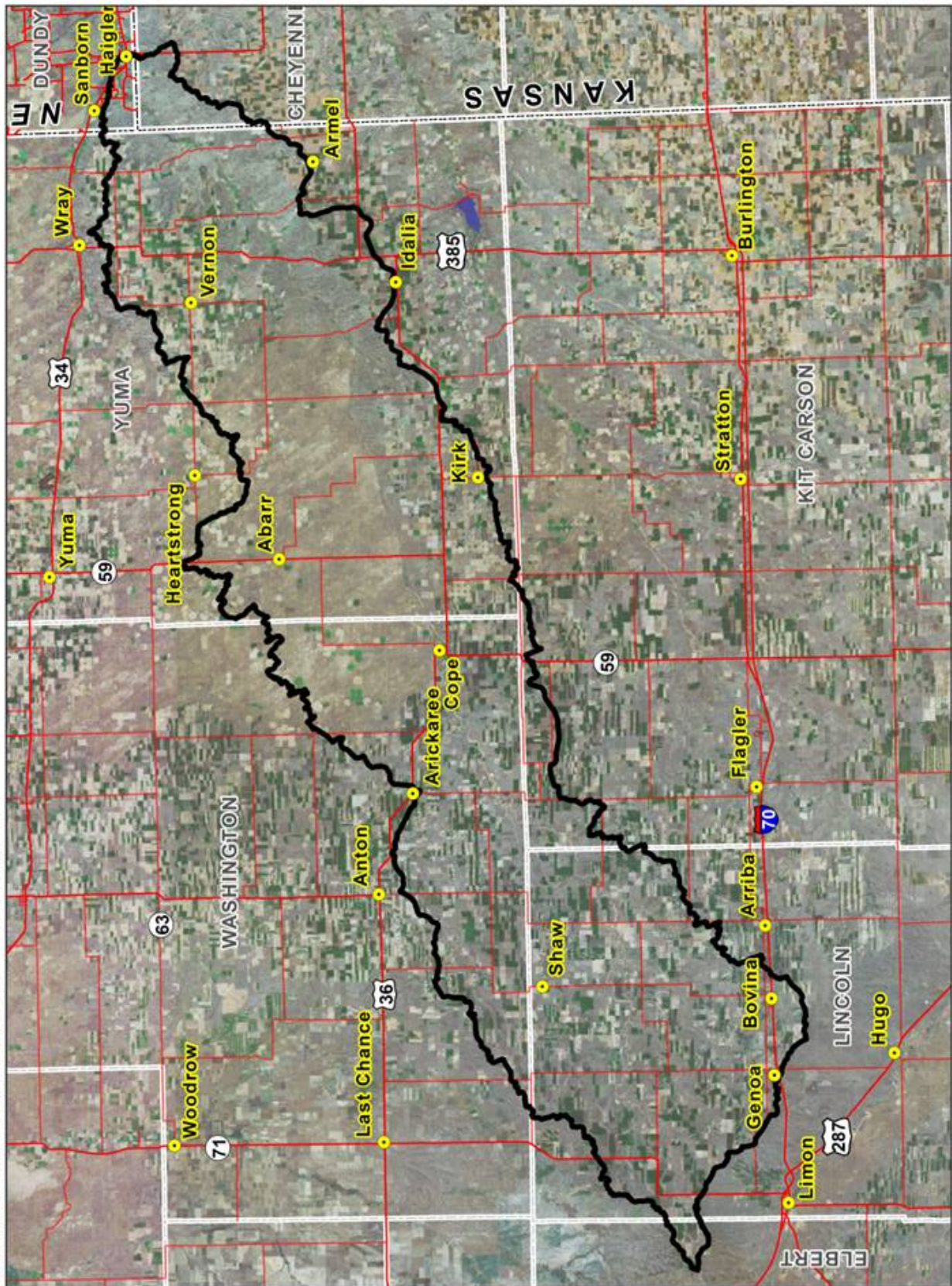
The Arikaree Watershed is located in the Republican River Basin, on the eastern plains of Colorado. The watershed is 1,115,485 acres in size, with approximately 538 farms and ranches covering 978,248 acres in the watershed. As of April 2005, there are 59,570 acres of land in the Conservation Reserve Program.



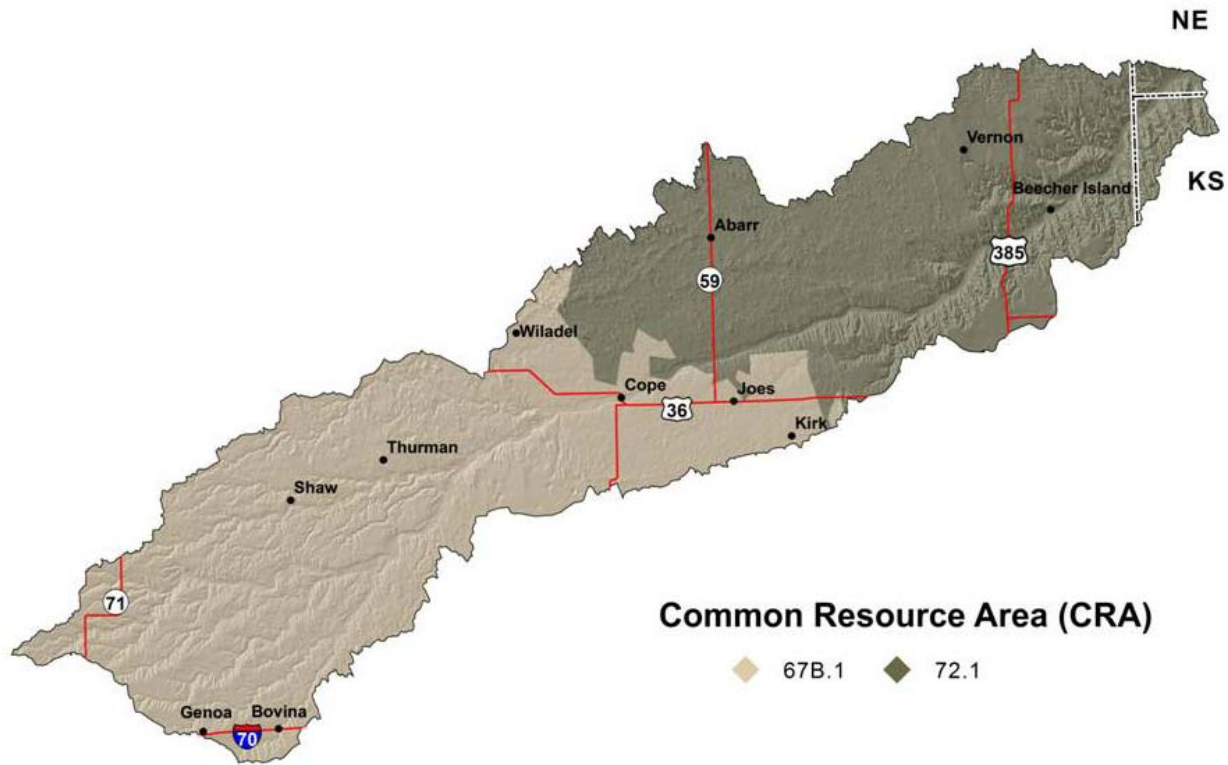
COLORADO County	County Acres	County Acres in ARIKAREE Watershed	% of County in the Watershed	% of Watershed in the County
Elbert	1,183,750	5,079	0.4%	0.4%
Kit Carson	1,383,889	34,487	2.5%	3.0%
Lincoln	1,654,463	296,317	17.9%	25.9%
Washington	1,615,004	262,635	16.3%	22.9%
Yuma	1,516,523	516,981	34.1%	45.1%



## Arikaree Watershed - 10250001



Satellite Imagery: Arc IMS Server - Geography Network Services hosted by ESRI



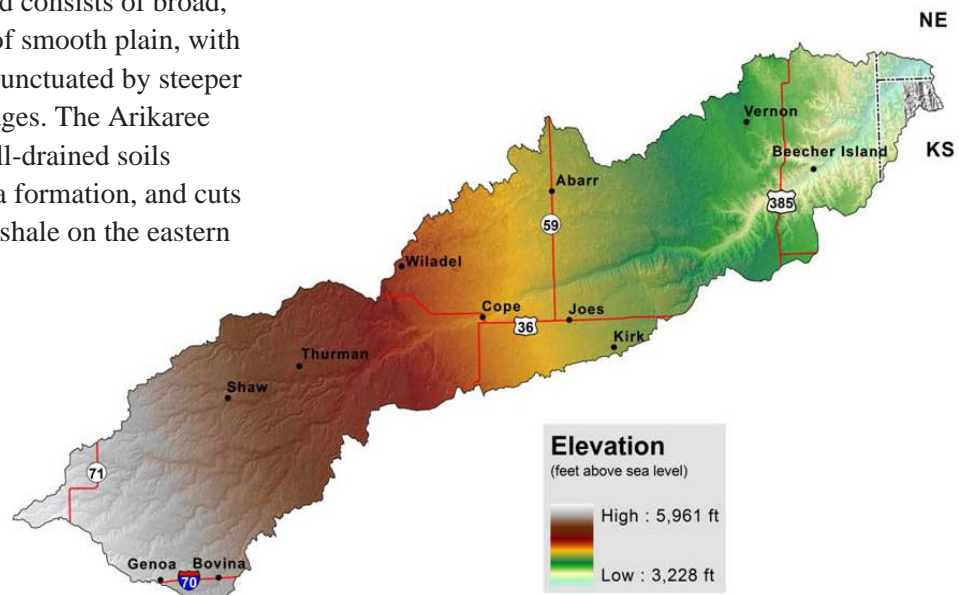
**Common Resource Areas (CRA):** Geographical areas where resource concerns, problems, and treatment needs are similar. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographical boundaries of the common resource area.

<u>MLRA</u>	<u>CRA</u>	<u>CRA NAME</u>	<u>DESCRIPTION</u>
67B	67B.1	Central Great Plains, Southern Part	The Central High Plains, Southern Part CRA is broad, undulating to rolling plains dissected by streams and rivers. Local relief is measured in tens of feet on the plains. Most soils are deep and formed in aeolian and alluvial materials. Pre-settlement vegetation was mainly mixed mid and short grass on the heavy soils, and tall grass on the sandy soils. Nearly all of this area in fallow cropland rotations or rangeland. Some cropland areas are irrigated.
72	72.1	Central High Tableland	The Central High Tableland CRA is broad, level to gently rolling, loess mantled tableland. Local relief is measured in feet on the tableland tens of feet and major river valleys bordered by steep slopes. Most soils are deep. Pre-settlement vegetation was mainly mixed mid and short grass on the heavy soils, and tall grass on the sandy soils. About half of this area is in rangeland and half is in cropland, including dry land small grain crops and irrigated corn and grain sorghum.



## Physical Description

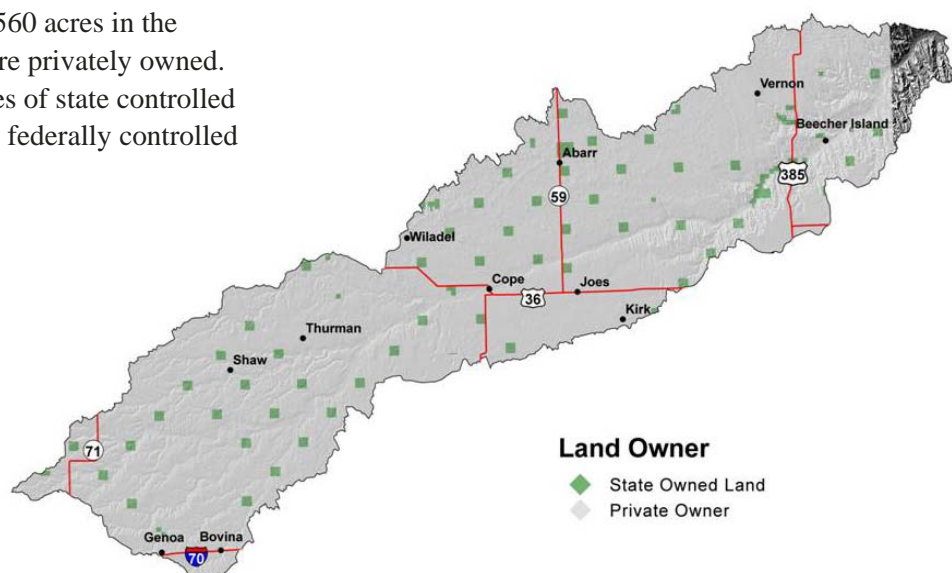
The Arikaree watershed consists of broad, inter-valley remnants of smooth plain, with gently rolling slopes, punctuated by steeper slopes along the drainages. The Arikaree River bisects deep, well-drained soils overlaying the Ogallala formation, and cuts into Cretaceous Pierre shale on the eastern edge of the watershed.



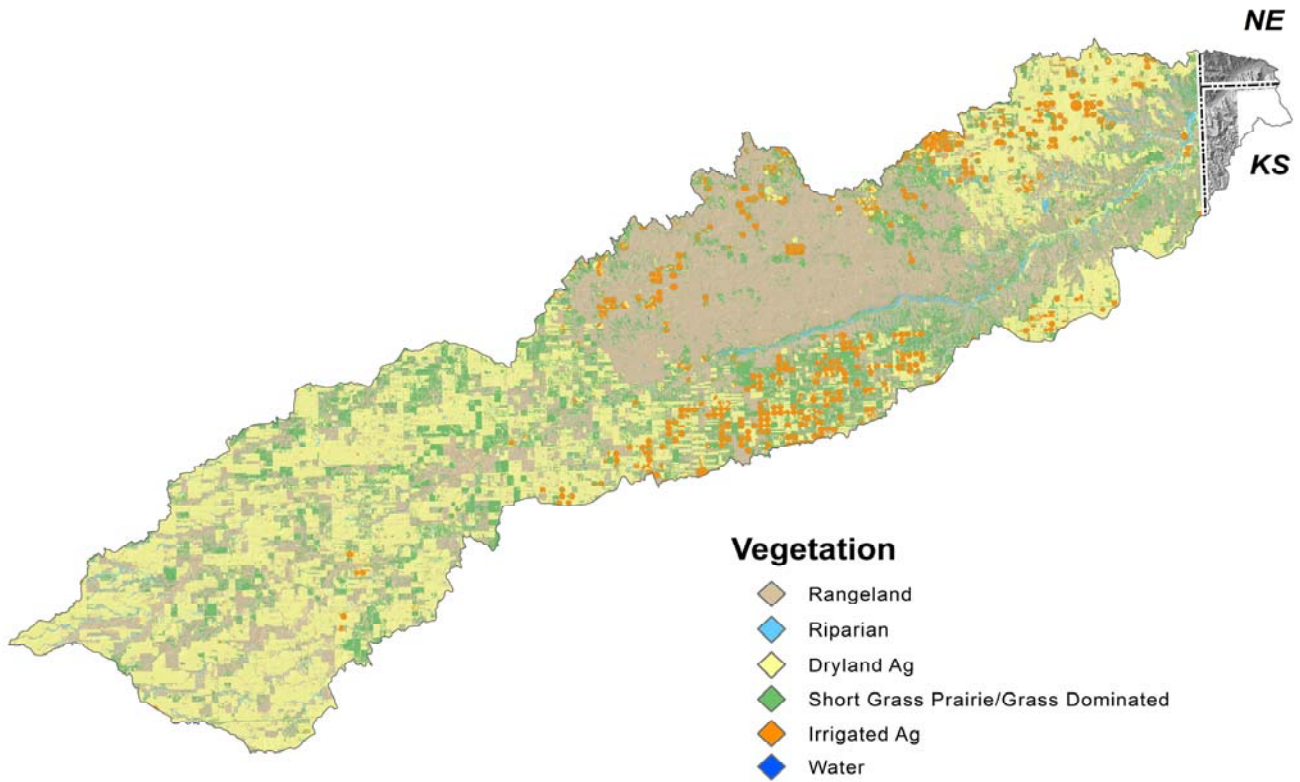
The predominant land use is agriculture, consisting of cash grain farming and livestock production. Cropland is dominated by dryland winter wheat rotations, and corn and grain sorghum production in areas where irrigation is available. Steeper slopes are generally in native grasses and used for livestock grazing.

## Land Ownership

Approximately 1,073,560 acres in the Arikaree Watershed are privately owned. There are 41,839 acres of state controlled land and 214 acres of federally controlled lands.







ARIKAREE Colorado Land Use	Total Acreage	Vegetation	Acreage
Cropland	472,673	Dryland Ag	420,623.0
		Irrigated Ag	52,049.9
Rangeland/Grassland	624,940	Grass Dominated	203,924.0
		Grass/Forb Mix	139,578.1
		Grass/Yucca Mix	47,410.9
		Sagebrush Community	8,403.2
		Sagebrush/Grass Mix	225,603.9
		Shrub/Grass/Forb Mix	20.1
Forest	3,653	Cottonwood	3,644.1
		Ponderosa Pine	8.7
Riparian	10,817	Riparian	2,574.6
		Herbaceous Riparian	8,242.7
Water	59	Water	59.1
Other	4,060	Soil	4,031.9
		No Data	28.0
Total Colorado Watershed Acres			1,116,202

Total Vegetation Acreage

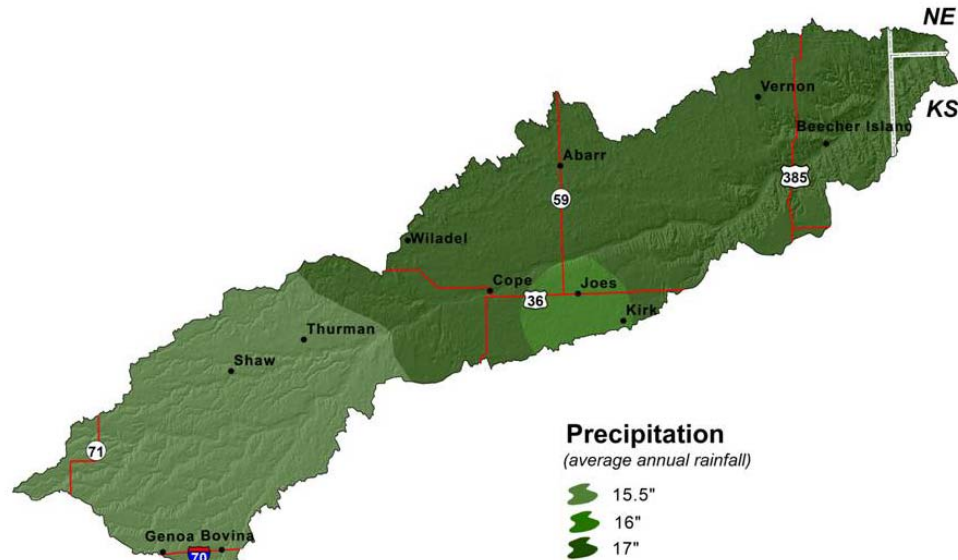
1,146,192

## Precipitation

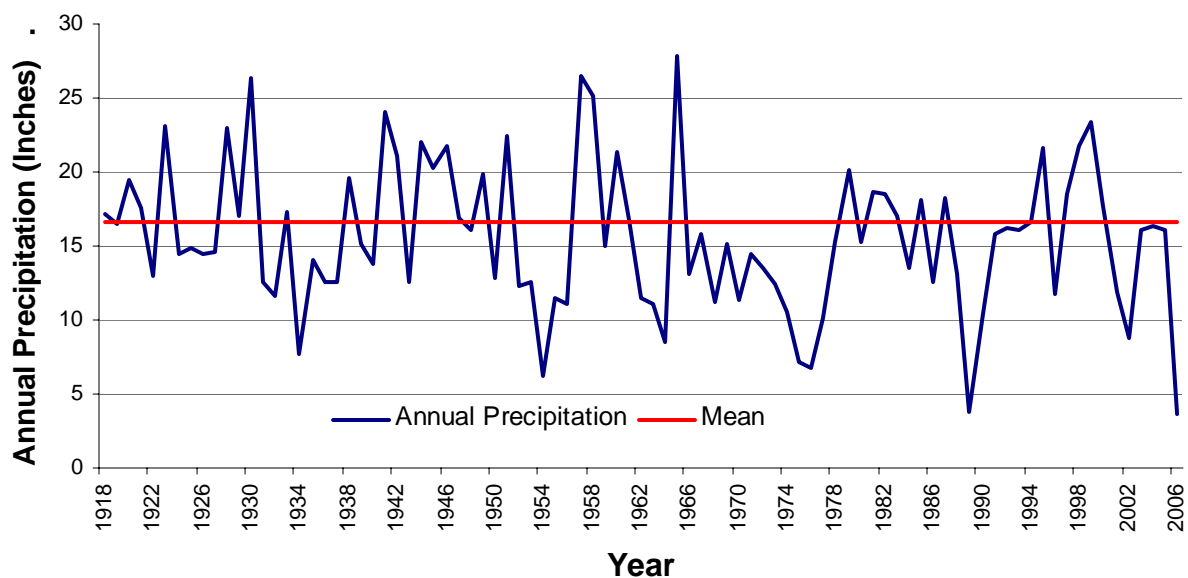
Precipitation in the Arikaree watershed averages between 15 and 17 inches per year. Droughts are common in the watershed, as with the rest of Colorado. Statewide, in the 1900's alone, four prolonged dry spells occurred. The first took place in the 1910s, and another, in the '30s, caused the dust-bowl period.

The second worst drought on record in the state occurred in the mid-50s, when a series of hot, dry summers following a period of scant mountain snowpack created water shortages. The fourth serious drought hit parts of Colorado in the late 1970s. In this century, the most severe drought since 1723 hit the state in 2002. Prior to the 1700's, researchers looking at tree ring records found evidence of droughts, even more severe than those during the record period, with some lasting many years.

Rainfall in the watershed typically occurs as frontal storms in the spring and early summer, and as high intensity, convective thunderstorms in late summer. Maximum precipitation is from mid spring through late autumn, and precipitation in winter is snow. The average annual temperature is from 37 to 65 degrees F. The frost free period averages 155 days but ranges from 106 to 184 days.



**Arikaree Annual Precipitation, 1918-2006**



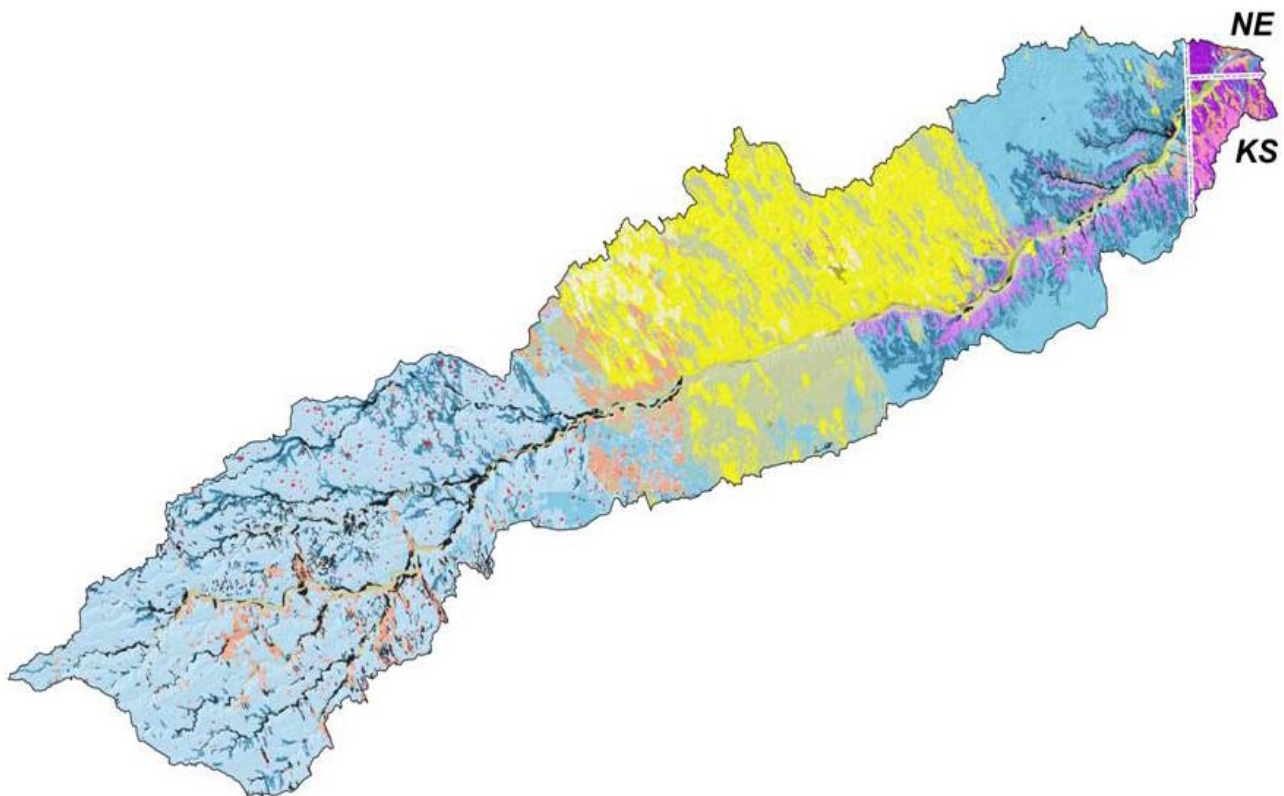
## Ecological Sites

The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production.

Ecological Site maps give an overall indication of the soils plant relationship in the area. More detailed descriptions of ecological sites are provided in the Field Office Technical Guide (FOTG). The FOTG is available in local offices of the Natural Resources Conservation Service (NRCS) and online at <http://www.nrcs.usda.gov/technical/efotg/>.

## Soil: Ecological Site Name

CLAY UPLAND	SANDS (PE16-20)
Choppy Sands	SANDY TERRACE (PE16-20)
Clayey	SHALLOW LIMY (PE16-20)
Clayey - veg. zone 2	SUBIRRIGATED (PE16-20)
Clayey Plains	Saline Lowland - Veg. zone 2
Deep Sands	Saline Overflow
Gravel Breaks	Saline Subirrigated
LOAMY LOWLAND (PE16-20)	Salt Flat
LOAMY TERRACE (PE16-20)	Salt Meadow
LOAMY UPLAND (PE16-20)	Sands
LOESS BREAKS (PE16-20)	Sandstone Breaks
Limestone Breaks	Sandy
Limy Upland	Sandy (formerly Sandy Plains)
Loamy	Sandy Bottomland
Loamy Bottomland	Sandy Meadow
Loamy Plains	Sandy Plains
Loamy Slopes	Sandy Salt Flat
Loamy Upland	Shallow to Gravel - Veg. zone 2
Loess Breaks	Shaly Plains
Overflow	Subirrigated
Plains Swale	No Data



**Land Capability Classification** shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes. Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use.

## Land Capability Classes

**Class 1** - soils have few limitations that restrict their use.

**Class 2** - soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

**Class 3** - soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

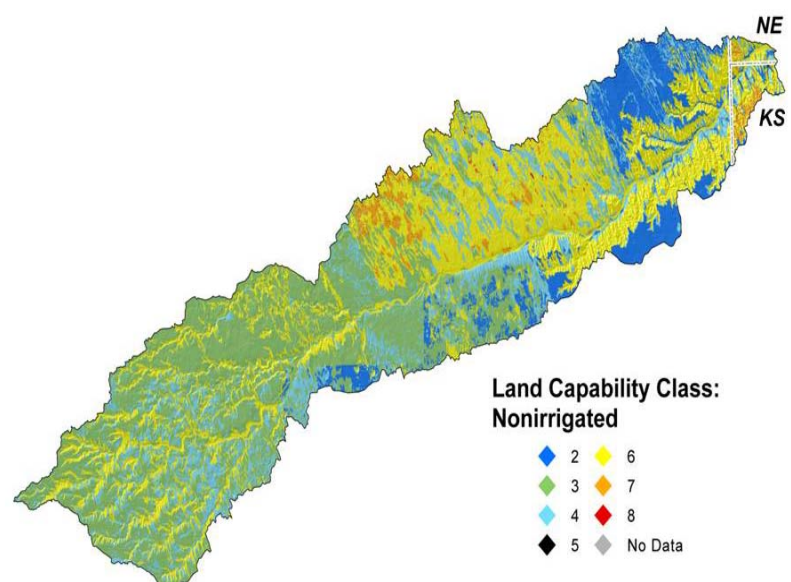
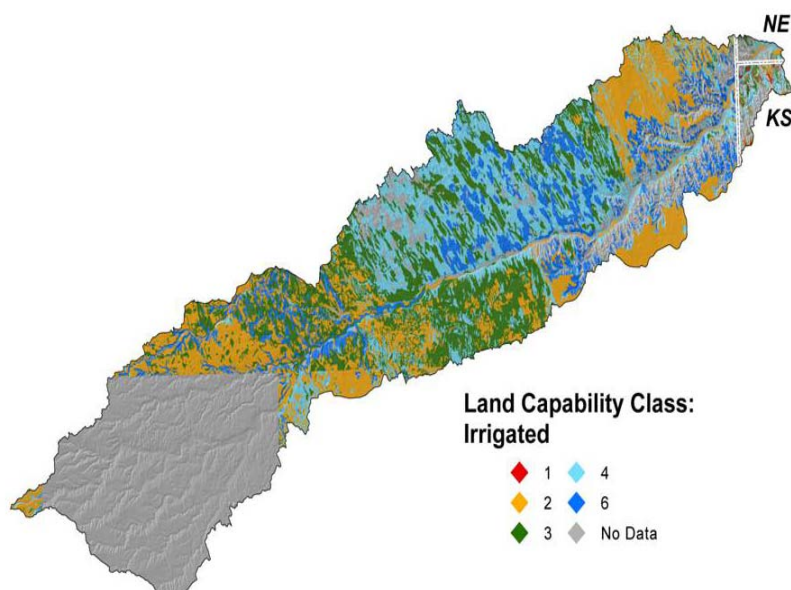
**Class 4** - soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

**Class 5** - soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

**Class 6** - soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

**Class 7** - soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

**Class 8** - soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or aesthetic purposes.



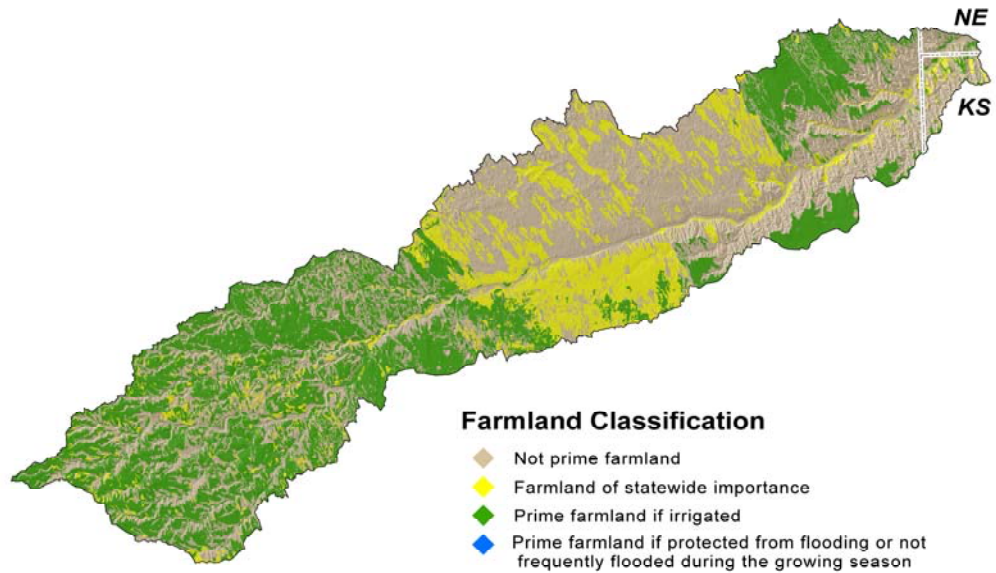


## Farmland Classification

Prime farmland is land that has the best combination of physical characteristics for producing food, feed, forage, fiber and oil seed crops and is also available for these. Colorado had approximately 1,696,800 acres of nonfederal prime farmland recorded in 1997. This

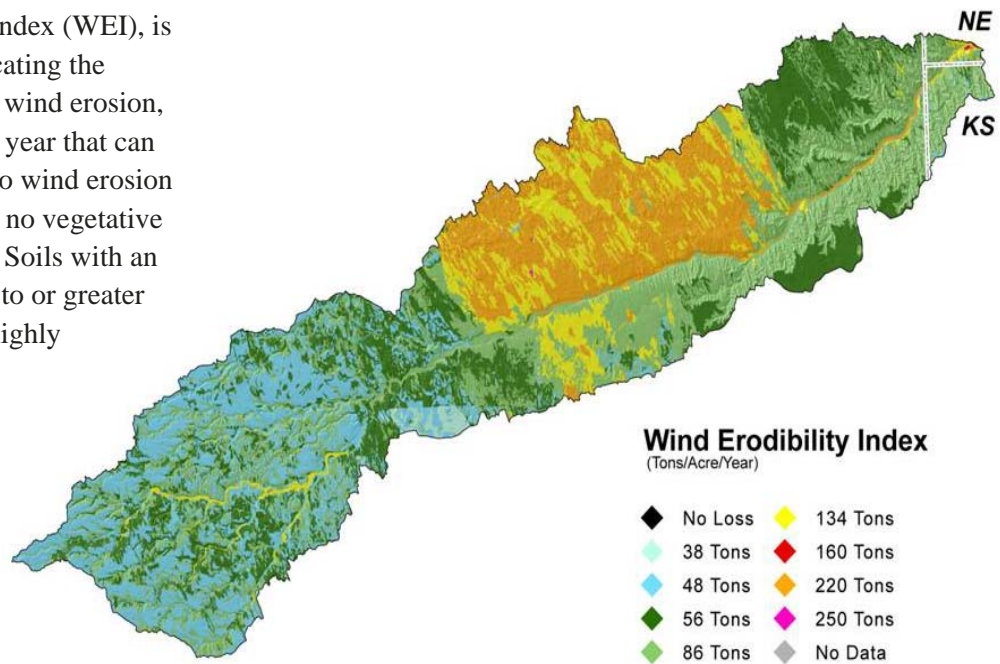
represents over 2 percent of the states

total land area or 4 percent of the nonfederal land in Colorado. Nationally, 64 percent of soils classified as prime farmland are being used for cropland. In Colorado, 93 percent of the soils classified as prime farmland are being utilized as cropland.



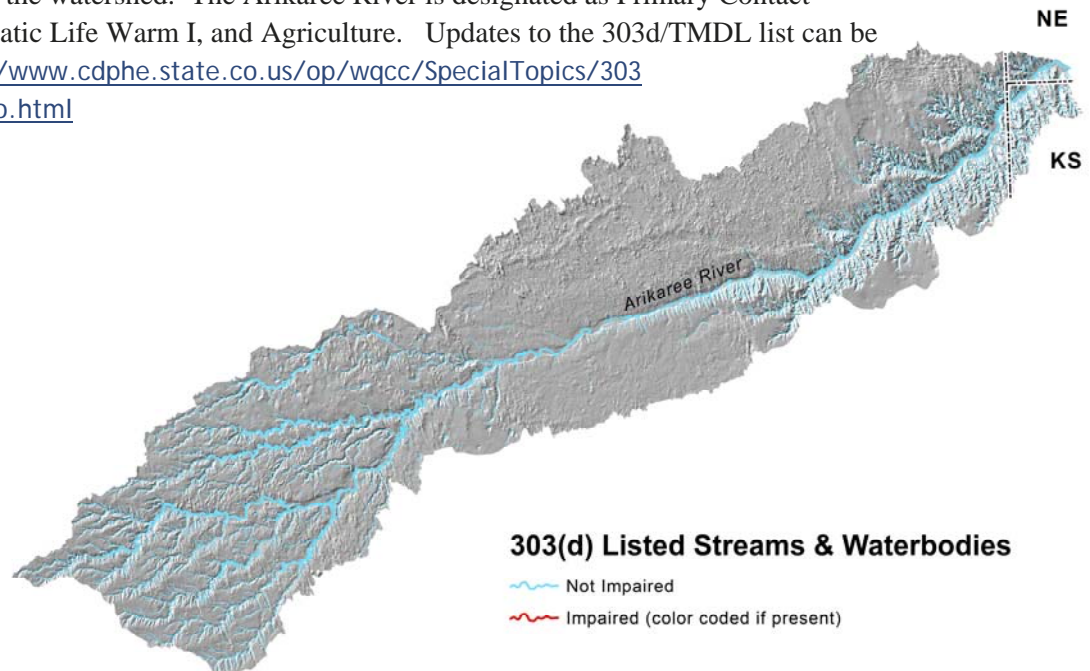
## Wind Erodibility Index

The Wind Erodibility Index (WEI), is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion if it is assumed there is no vegetative cover or management. Soils with an erodibility index equal to or greater than 8 are considered highly erodible.



## Surface Water Quality

Surface water quality in the Arikaree Watershed is generally good. Section 303(d) of the Clean Water Act requires states to identify and list all water bodies where state water quality standards are not being met for designated uses. As indicated in the map, there are no 303(d) listed streams in the watershed. The Arikaree River is designated as Primary Contact Recreation, Aquatic Life Warm I, and Agriculture. Updates to the 303d/TMDL list can be found at: [http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303\(d\)/303dtmdlpro.html](http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303(d)/303dtmdlpro.html)



## Ground Water

The High Plains Aquifer underlies the Arikaree watershed, and is the primary source of irrigation and domestic water for the area. The High Plains aquifer is an extensive regional aquifer that underlies the Great Plains states extending from South Dakota on the north to Texas and New Mexico on the south. The Denver Basin Aquifer underlies the easternmost tip of the watershed.

Ground water quality is generally good, although moderately to very hard. Total dissolved solids in the aquifer have risen significantly since the early 1900s, and in some areas, the water may exceed drinking water standards for sulfate, chloride, fluoride, iron and arsenic. These concentrations may be naturally derived from geologic sources.

## Hydrogeologic Units of the High Plains Aquifer

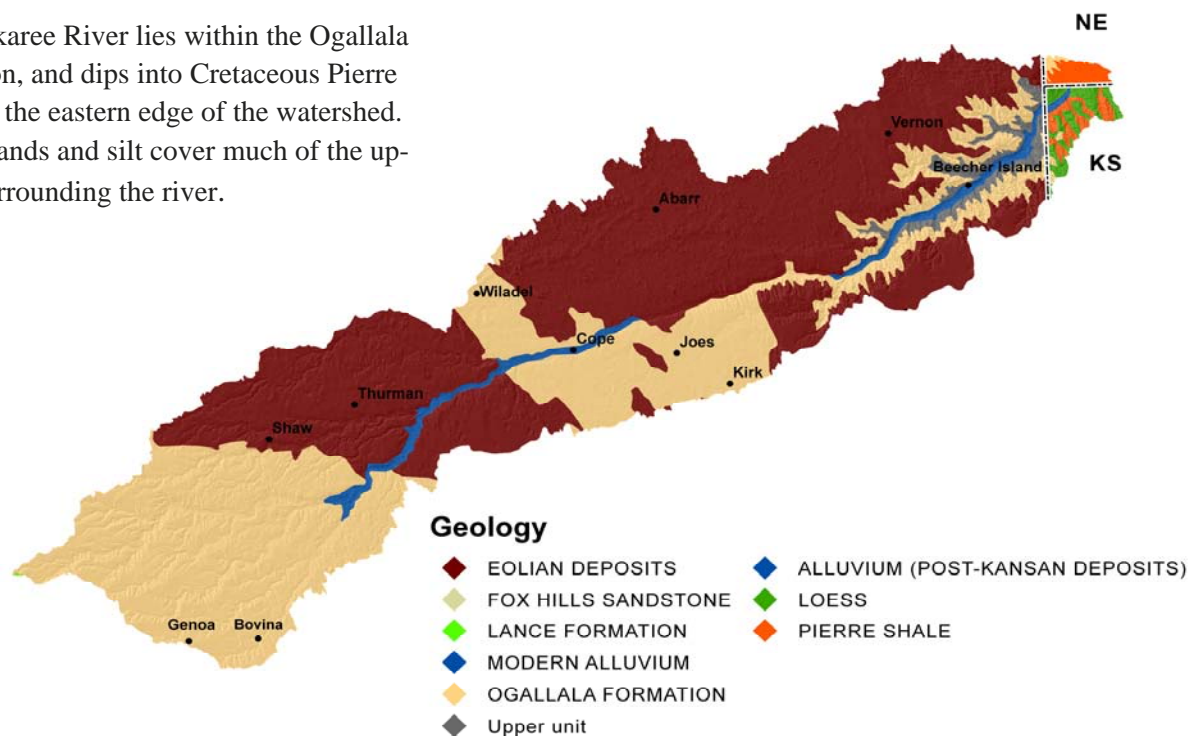
Era	System	Series	Strati-graphic Unit	Unit Thickness (feet)	Physical Characteristics	Hydro-geologic Unit	Hydrologic Characteristics
Cenozoic	Quaternary	Holocene and Pleistocene	Valley-fill deposits	0 to 60	Stream deposits of gravel, sand, silt, clay associated with the most recent cycle of erosion and deposition along present streams	High Plains aquifer	Shallow water-table aquifer(s). Well yields range from 500 to more than 1,000 gpm in several river valleys
			Dune sand	0 to 300	Fine to medium sand with small amounts of clay, silt, and coarse sand formed into hills and ridges by the wind		Typically lies above the water table; has a high infiltration rate and is important for ground-water recharge
			Loess	0 to 250	Silt with lesser amounts of very fine sand and clay deposited as windblown dust		Lies above the water table and does not yield water; serves for minor recharge
		Pleistocene	Unconsolidated alluvial deposits	0 to 550	Stream deposits of gravel, sand, silt, and clay locally cemented by calcium carbonate into caliche or mortar beds		Primary portion of the High Plains aquifer; mostly unconfined; yields range from 100 to 3,100 gpm; typically less than 300 gpm in Colorado; Ogallala is the most significant High Plains aquifer resource
	Tertiary	Miocene	Ogallala Formation	0 to 700	Poorly sorted clay, silt, sand, and gravel generally unconsolidated; forms caliche layers or mortar beds when cemented by calcium carbonate; Ogallala makes up large part of High Plains aquifer		
			Arikaree Group	0 to 1,000	Predominantly massive, very-fine to fine-grained sandstone with localized beds of volcanic ash, silty sand, siltstone, claystone, sandy clay, limestone, marl, and mortar beds; part of the High Plains aquifer		Can be confined; moderately permeable. May yield up to 200 gpm in localized areas
		Oligocene	White River Group	0 to 700	Upper unit, Brule Formation, is considered part of the High Plains aquifer in Colorado, predominantly massive sandstone containing sandstone beds and channel deposits		Typically confined, except at outcrop; yields typically less than 100 gpm
					Lower unit, Chadron Formation, mainly consists of varicolored, bentonitic, loosely to moderately cemented clay and silt		Chadron is mostly impermeable

From Gutentag and others, 1984

Table from the USGS Groundwater Atlas: <http://geosurvey.state.co.us/wateratlas/chapter5>














## Geology

The Arikaree River lies within the Ogallala formation, and dips into Cretaceous Pierre shale on the eastern edge of the watershed. Eolian sands and silt cover much of the uplands surrounding the river.



## Threatened & Endangered Species





*State & Federally Threatened, Endangered & Candidate Species as well as Species of Special Concern in Arikaree Watershed.*

	Common Name	Scientific Name	Class	Federal Status	State Status	Comments
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Birds	None	Threatened	May migrate through watershed
	Black-footed Ferret	<i>Mustela nigripes</i>	Mammals	Endangered	Endangered	No current records of occurrence
	Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Mammals	None	Concern	Occurs in the watershed
	Brassy Minnow	<i>Hybognathus hankinsoni</i>	Fish	None	Threatened	Occurs in the watershed
	Burrowing Owl	<i>Athene cunicularia</i>	Birds	None	Threatened	Occurs in the watershed
	Common garter snake	<i>Thamnophis sirtalis</i>	Reptiles	None	Concern	May occur in the watershed
	Cylindrical papershell	<i>Anodontoidea ferussacianus</i>	Gastropods	None	Concern	May occur in the watershed
	Ferruginous Hawk	<i>Buteo regalis</i>	Birds	None	Concern	Occurs in the watershed
	Long-Billed Curlew	<i>Numenius americanus</i>	Birds	None	Concern	Occurs in the watershed
	Mountain Plover	<i>Charadrius montanus</i>	Birds	None	Concern	Occurs in the watershed
	Northern Cricket Frog	<i>Acris crepitans</i>	Amphibians	None	Concern	May occur in the watershed
	Northern leopard frog	<i>Rana pipiens</i>	Amphibians	None	Concern	May occur in the watershed
	Plains Leopard Frog	<i>Rana blairi</i>	Amphibians	None	Concern	Occurs in the watershed
NO PHOTO AVAILABLE	Plains Minnow	<i>Hybognathus placitus</i>	Fish	None	Endangered	Occurs in the watershed



## Threatened & Endangered Species (*continued*)

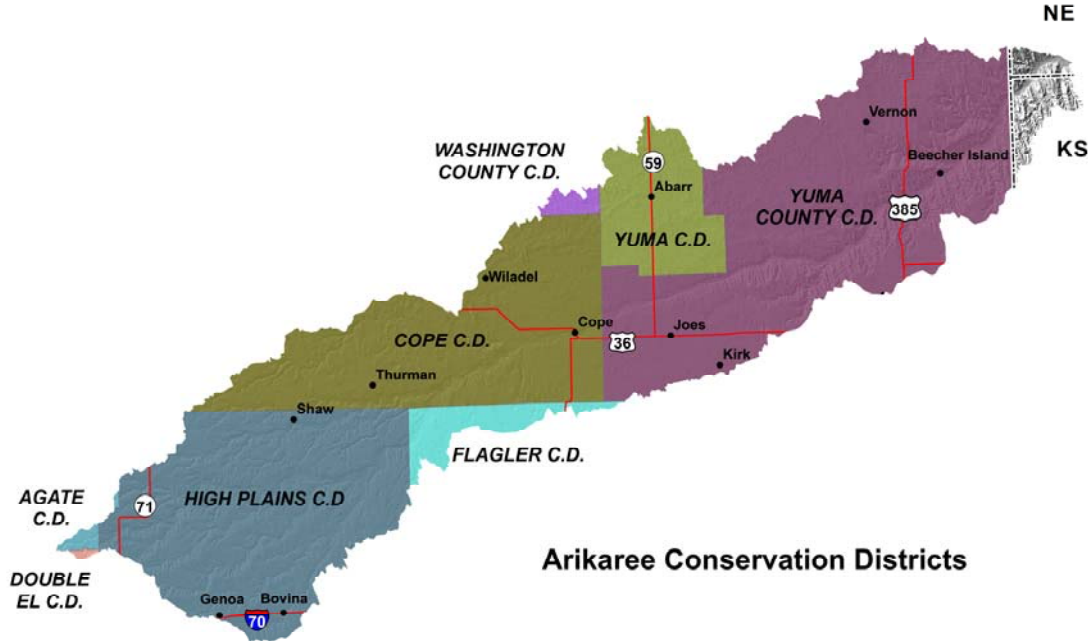
*State & Federally Threatened, Endangered & Candidate Species as well as Species of Special Concern in Arikaree Watershed.*

	Common Name	Scientific Name	Class	Federal Status	State Status	Comments
	Plains Orangethroat Darter	<i>Etheostoma spectabile</i>	Fish	None	Concern	Occurs in the watershed
	Stonecat	<i>Noturus flavus</i>	Fish	None	Concern	May occur in the watershed
	Swift fox	<i>Vulpes velox</i>	Mammals	None	Concern	Occurs in the watershed
	Yellow mud turtle	<i>Kinosternon flavescens</i>	Reptiles	None	Concern	May occur in the watershed

Short grass is the dominant terrestrial habitat type on the heavy soils in the watershed, and tall/mid/short/shrub is the dominant type on sandy soils. Burrowing owl, mountain plover, black-tailed prairie dog, and swift fox are representative species for the shortgrass habitat. Greater prairie chickens use the sand sage-mixed grass rangeland habitats in the eastern half of the watershed. Water is scarce and the native species in this watershed are those that can survive without abundant water supplies. Riparian areas, playa lakes, and the occasional stock pond provide seasonal to intermittent aquatic habitats. Economically important wildlife species that occur in much of the watershed include black bullhead, green sunfish, pronghorn (antelope), mule and white-tailed deer, mourning dove, pheasant, and greater prairie chicken. Bobwhite quail and wild turkey (Rio Grande) occur in the Arikaree River riparian area.

Social Data	Elbert	Kit Carson	Lincoln	Washington	Yuma
Demographics (US Census, American Factfinder)					
Total population	19,872	8,011	20,504	4,926	9,841
Male	9,966	4,236	10,834	2,504	4,840
Female	9,906	3,775	9,670	2,422	5,001
Median age (years)	37.2	37.4	36.5	40.2	37.3
White	18,923	6,992	18,792	4,748	9,267
Black or African American	128	139	420	2	11
American Indian and Alaska Native	125	41	131	28	28
Asian	74	26	82	5	7
Native Hawaiian and Other Pacific Islander	18	3	14	1	2
Some other race	255	737	772	100	407
Hispanic or Latino (of any race)	766	1095	2439	310	1268
Economic Characteristics (US Census, American Factfinder)					
In labor force (population 16 years and over)	11,056	3,746	9,771	2,400	4,919
Median household income (dollars)	62,480	33,152	32,724	32,431	33,169
Median family income (dollars)	66,740	41,867	42,241	37,287	39,814
Per capita income (dollars)	24,960	16,964	16,721	17,788	16,005
Families below poverty level	145	198	454	121	235
Individuals below poverty level	791	908	2253	555	1244
County Agricultural Characteristics (Colorado Agricultural Census, county data tables)					
Farms (number)	1153	678	455	861	864
Land in farms/ranches (acres)	1,068,359	1,247,181	1,428,404	1,408,583	1,351,010
Average size farm/ranch (acres)	927	1,840	3,139	1,636	1,567
Median size farm (acres)	160	11,112	1,497	865	1,000
Average age of farmer or rancher	52.8	54.3	55.6	55.4	52.7
Net cash return from ag sales (\$1,000)	108	3,392	4,829	2,612	58,023
Cattle and calves (number)	36,000	148,000	40,000	60,000	250,000

## Arikaree Watershed Natural Resource Concerns



### Conservation District Priorities

The Colorado Conservation Districts identified and prioritized these resource concerns during facilitated public meetings and they are included in their Long Range Plans. Higher scores indicate higher priority

Resource Concern By Priority	Burlington	Cheyenne	Cope	Flagler	High Plains	Washington County	Yuma	Yuma County	Totals
Soil Erosion	4		5	5	5	5	4	4	32
Rangeland/ Grazingland Health and Productivity	2	5	3	4	4	4	3	2	27
Water Quality/ Quantity	5	3	4		1		5	5	23
Plants-Invasive Species		1			3			3	7
Trees	3	2	2						7
Wildlife Habitat					2				2

### Concerns and Issues Identified By Other Entities (*NRCS staff, Colorado State University, and others*)

- Water Quantity - meeting Republican River Compact requirements
- Conversion from high water use crops to lower water use crops
- Invasive weeds
- Wind erosion

Selected Conservation Application Data					
	FY 2004	FY 2005	FY 2006	FY 2007	Total
Total Conservation Systems Planned (Acres)	529,441	1,900,002	178,030	233,662	2,841,135
Total Conservation Systems Applied (Acres)	136,419	101,588	129,972	276,888	644,867
Practices					
Terraces (Acres)	32,179	11,667	34,530	0	78,376
Soil Enhancement (Acres)	Not Available	5,047	Not Avail.	43,310	48,357
Nutrient Management	1,894	2,698	3,444	30,000	38,036
Water Management	2,364	538	1,224	19,351	23,477

### Conservation Systems to Address Major Resource Concerns

Primary Resource Concern:				
Conservation System Description:	Prescribed Grazing—Planned management that provides adequate recovery opportunity between grazing events and proper stocking of animals. Estimate 600,000 acres need to be treated on median sized ranches of 3,500 acres.			Based on Conservation System Guide Code: CO 67B.1-GR-01-R-Grazing
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost per Median Sized Ranch (\$)
Prescribed Grazing				
Fencing (382)	Ft.	50,000	.40	20,000
Pipeline (516)	Ft.	2,000	2.40	4,800
Upland Wildlife Habitat Management (645)	Ac.	300	na	0
Watering Facility (614)	No.	6	410	2,460
Costs to apply prescribed grazing per median sized ranch of 3,500 acres	No.	150	27,260	
Subtotal Rangeland costs:				\$4,089,000



## Conservation Systems to Address Major Resource Concerns (cont'd)

Primary Resource Concern: Dry Cropland Seasonal				
Conservation System Description:	HEL cropland with wind erosion as a major resource concern. Conservation system includes crop rotation, terraces, seasonal residue management, and nutrient and pest management. Estimate 70,000 acres need to be treated on median sized farms of 2,000 acres			Reference Conservation System Guide Code: CO 72.1-CR-Dryland -R-1
Practices	Unit	Quantity	Cost/Unit (\$)	Estimated Cost (\$)
Conservation Crop Rotation (328)	Ac.	8,400	0.5	4,200
Nutrient Management (590)	Ac.	3,500	5.0	17,500
Pest Management (595)	Ac.	3,500	5.0	17,500
Residue Management, Seasonal (344)	Ac.	9,000	1.2	10,800
Cost to apply cropland conservation system per median sized farm of 2,000 acres	No.	35	\$11.7/Ac	\$23,400
Subtotal Costs Dryland Crops \$ 819,000				

## General Effects, Impacts, and Estimated Costs of Application of Conservation Systems

Landuse	Resource Concern	Measurable Effects	Non-measurable Effects	Estimated Cost (\$)
Rangeland	Plants		Improved plant condition, productivity, health and vigor. Grazing animals have adequate feed, forage and shelter. Wildlife habitat is sustained or improved.	4,089,000
Dryland Crop	Soil	50,400 total tons/yr soil saved	Cropland sustainability	819,000
Estimated Total Costs to Address Major Resource Concerns:				\$4,908,000

## REFERENCES NOT CITED

**Common Resource Area (CRA)**, a subdivision of the Major Land Resource Area (MLRA), is a geographical area where resource concerns, problems, or treatment needs are similar. Visit <http://soils.usda.gov/survey/geography/cra.html>.

**Land Ownership** (status, 12/31/2006 dataset) from the Colorado Department of Transportation (CDOT). Visit <http://www.dot.state.co.us>.

**Vegetation** data was generated using the Colorado Division of Wildlife's "Colorado Vegetation Classification Project" (CVCP) data. For more information on the Colorado Vegetation Classification Project, visit <http://ndis.nrel.colostate.edu/coveg>.

**Threatened and Endangered Species** information was gathered by the NRCS State Biologist using data from the Colorado Division of Wildlife (CDOW) Natural Diversity Information Source (NDIS).

**303(d)** listed streams map was created using data from Colorado Department of Public Health & Environment's Water Quality & Control Commission. Impaired streams are current as of April 30, 2006.

**Geology & Water** information was obtained from the USGS, <http://geosurvey.state.co.us/wateratlas/>, and the Colorado Department of Public Health and Environment, [http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303\(d\)/303dtmdlpro.html](http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303(d)/303dtmdlpro.html)

**Resource Concerns** were identified using the Colorado Association of Conservation Districts' (CACD) long range (10 year) plans from the period of 1996-2000. Only the top three environmental resource concerns for each district were used. For more information on Colorado's Conservation Districts, visit <http://www.cacd.us>.

Soils Maps were generated using Soil Survey Geographic Database (SSURGO) tabular and spatial data. To download SSURGO data, visit <http://soildatamart.nrcs.usda.gov>.

**Average Annual Precipitation** data was developed through a partnership between the Natural Resources Conservation Service's (NRCS) National Water and Climate Center (NWCC), the National Cartography and Geospatial Center (NCGC), and the PRISM (the Parameter-elevation Regressions on Independent Slopes Model) group at Oregon State University (OSU), developers of PRISM.

**Relief & Elevation** maps were created using the National Elevation Dataset (NED), 30m Digital Elevation Model (DEM) raster product assembled by the U.S. Geological Survey (USGS).

**Conservation Systems to address major resource concerns** were extracted from the Conservation Systems Guides (CSG) compiled from local conservationists by the NRCS Ecological Sciences Section at the Lakewood State Office.

**Effects and Impacts** of application of conservation systems were extracted from Colorado eFOTG, Section III, Resource Quality Criteria, NRCS, Colorado, March 2005 and CSG.

**Cost Estimates to apply conservation systems** were developed by estimating costs per median size farm and ranch and calculating costs from the field office cost lists.

